The Electrochemical Performance of LiMn$_{1.96}$Mg$_{0.04}$O$_4$ Cathode Material Prepared by Solid-State Combustion Method

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doi: 10.20964/2016.11.71

Received: 23 July 2016 / Accepted: 19 July 2016 / Published: 10 October 2016

Mg-doped cathode materials LiMn$_{1.96}$Mg$_{0.04}$O$_4$ were synthesized at 500°C for different calcining time by solid-state combustion method. The effects of calcining time on the crystal structure and microstructure were analyzed by scanning electron microscopy (SEM) and X-ray diffraction (XRD), the electrochemical properties were characterized by charge-discharge cycling test, cyclic voltammetry (CV) measurement and electrochemical impedance spectroscopy (EIS). The results showed that all samples demonstrated a single spinel structure; the crystal and the grain size grow up with the calcining time increasing. The LiMn$_{1.96}$Mg$_{0.04}$O$_4$ cathode calcined for 12 h had a high initial discharge specific capacity of 118.6 mAh g$^{-1}$ and the best capacity retention was 93.00 % after 40 cycles at 0.2 C.

Keywords: Lithium-ion battery; LiMn$_{1.96}$Mg$_{0.04}$O$_4$; Electrochemical performance; cathode materials; solid-state combustion method

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